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Evaluating the Successes of Land Trust Conservation: Social Effects of Incentive-based Efforts in Northern Michigan

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FLORIDA INTERNATIONAL UNIVERSITY

Miami, Florida

EVALUATING THE SUCCESSES OF LAND TRUST CONSERVATION: SOCIAL EFFECTS
OF INCENTIVE-BASED EFFORTS IN NORTHERN MICHIGAN

A thesis submitted in partial fulfillment of the

requirements for the degree of

MASTERS OF SCIENCE

in

ENVIRONMENTAL STUDIES

by

Kathryn Nicole Braddock

2017

To: Dean Michael R. Heithaus
College of Arts, Sciences and Education

This thesis, written by Kathryn Nicole Braddock, and entitled Evaluating the Successes of Land Trust Conservation: Social Effects of Incentive-Based Efforts in Northern Michigan. having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this thesis and recommend that it be approved.

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The thesis of Kathryn Nicole Braddock is approved.

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Vice President for Research and Economic Development and
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Florida International University, 2017

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All rights reserved in regard to the first chapter of this thesis which has been submitted and accepted to the Natural Areas Journal. The article entitled “Conserving Nature Through Land Trust Initiatives: A Case Study of the Little Traverse Conservancy” will be published in October, 2017 in the 37th volume and 4th issue of the journal.

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ABSTRACT OF THE THESIS

EVALUATING THE SUCCESSES OF LAND TRUST CONSERVATION: SOCIAL EFFECTS
OF INCENTIVE-BASED EFFORTS IN NORTHERN MICHIGAN

By

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Florida International University, 2017

Miami, Florida

Professor Joel Heinen, Major Professor

The Little Traverse Conservancy (LTC) of Michigan is a contemporary land trust organization. A case study of LTC identified the accomplishments and challenges of LTC as well as criteria for successful land conservation. Research emphasizes knowledge gaps in effective conservation efforts. An applied research protocol to improve ecological and socio-political knowledge about the workings of LTC and, by corollary, other similar land trusts is recommended.

Key informant interviews ($n=33$) were conducted with LTC stakeholders. The objective of these interviews was to understand the perceptions and motivations of LTC stakeholders and more broadly, of small-scale land conservation. Findings show that social motivators including a sense of environmental ethic and responsibility for future generations were among the most highly discussed topics among stakeholders. The study provides a case for the importance of social science research in land conservation and land use analyses.

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ABBREVIATIONS AND ACRONYMS

CFA	Commercial Forest Act Program
GIS	Geographic Information Systems
LTA	Land Trust Alliance
LTBB	Little Traverse Bay Bands of Odawa Indians
LTC	Little Traverse Conservancy
MDARD	The Michigan Department of Agriculture and Urban Development
MDNR/DNR	Michigan Department of Natural Resources
MNFI	Michigan Natural Features Inventory
MSU	Michigan State University
NGO	Non-Governmental Organizations
SPSS	Statistical Package for the Social Sciences
TEK	Traditional Ecological Knowledge
TMWC	Tip of the Mitt Watershed Council
TNC	The Nature Conservancy
UMBS	University of Michigan Biological Station

I.INTRODUCTION

Numerous sources emphasize the importance of decentralization, meaningful participation as well as social and economic incentive structures to promote conservation efforts at small scales (Low and Heinen, 1993; Heinen, 1994; Agrawal and Gibson, 1999). Local communities are drivers of social constructs, and through understanding community dynamics, interests and motivations, effective conservation tools can be created and enforced. Social and behavioral studies can help in identifying and synthesizing this information in a meaningful way that can promote successful conservation strategies (Reddy et al., 2017).

A popular and growing method for the establishment of protected areas is through land trust initiatives. The number of land trusts within the United States increased in the 1980s through the 1990s, when the U.S. economy stimulated expansion for non-profit organizations (Howard, 1992). This growth was attributed to the effective publicity of land trusts regarding acquisition of ecologically and historically important lands (Parker, 2004). Currently, there are over 1,700 land trusts within the U.S., most of which base their organizational models that target stakeholders through incentive-based programs (LTA, 2011; Rissman and Butsic, 2011; Higgins et al., 2012).

Large national land trust organizations such as The Nature Conservancy (TNC), Appalachian Trail Conservancy, and North American Land Trust, as well as many smaller-scaled regional or local organizations, frequently work in concert with government at local, state or national levels (Cheever, 1996; LTA, 2017). They rely on multiple mechanisms for conservation ranging from conservation easements on private lands to direct land and monetary donations and the support of volunteers (Alonzo and Heinen, 2011; Giannini and Heinen, 2014).

Often, substantial land and monetary donations will be incentivized socially through programs that name property, buildings, or public outreach initiatives after large donors, as well as economically through tax breaks. People are frequently intrinsically motivated to maintain social standing by advertising some measure of social investment and these types of incentives

can be very powerful in relatively small scaled societies in which people interact frequently (Heinen, 1994). Conservation easement programs used by land trusts work by motivating donors through economic incentives such as income, inheritance, or property tax deduction (Merenlender et al., 2004).

The tools used by land trusts are dependent on the actions of their member-base and the citizens in the regions in which the trusts are located. The evident dependence on community makes social science and incentive-based research imperative in the study and perpetuity of these conservation organizations (Braddock and Heinen, 2017).

While lands kept through such mechanisms are generally motivators for community involvement within conservation related-programs, such units are generally small and do not correspond to any category of protected area as recognized by the World Conservation Union (Heinen, 1995). However, much work has shown that small reserves can be important for the conservation of many species of plants (Laguna et al., 2004; Parker, 2012; Diamond and Heinen, 2016), invertebrates and smaller-sized vertebrates (O'Brien, 1998), and they can also act as corridors, stepping stone reserves or partial buffers around larger tracts of protected land (Alonzo and Heinen, 2011; Borgerhoff-Mulder and Coppelillo, 2005; Rissman et al., 2007), thus enhancing the conservation prospects of larger vertebrates and myriad migratory species.

The Little Traverse Conservancy (LTC) is an example of a land trust organization in northern Michigan, USA (LTC, 2016a). The LTC organization was founded in 1972 and currently has over 4,000 individual members. It was established on the principles of stewardship and the voluntary actions of citizens within its surrounding communities and maintains large educational and outreach programs in addition to their land acquisition efforts. The organization has had part in protecting over 6,250 hectares (ha) of land, manages over 187 nature preserves and is responsible for almost 9,000 ha of land through easement agreements on private property (LTC, 2016b; LTC, 2016c). The mission of the conservancy is “to protect the natural diversity

and beauty of northern Michigan by preserving significant land and scenic areas, and fostering appreciation and understanding of the environment” (LTC, 2016a).

The successes of LTC thus far make it a good candidate for analysis and this call for analysis is validated by the absence of some detailed outcomes of the LTC land trust both socially and ecologically. The motivations at the local level to conserve land in northern Michigan through LTC programs are the main focuses of this research. A primary goal is to determine the conservation accomplishments as well as the viability of this type of conservation program. The study will consider more closely the types of social incentives that lead to support for the mission of land conservation. It also takes into consideration the involved direct (tax and financial) economic incentives as well as other relevant indirect economic incentives (e.g., higher property values because of non-developed lands). The information gained about social incentives as well as community behavior concerning conservation will be used to make recommendations to LTC regarding the successes of their non-monetary focused programs (Heinen, 1995).

II. CONSERVING NATURE THROUGH LAND TRUST INITIATIVES: A CASE STUDY OF THE LITTLE TRAVERSE CONSERVANCY OF NORTHERN MICHIGAN, USA.

Here we use key informant surveys (Shrestha-Acharya and Heinen, 2006; Ter-Ghazaryan and Heinen, 2007) with LTC stakeholders, as well as document surveys and a broader literature review to explore the workings of LTC. We ask several broad questions: what are the successes of the organization, what levels and types of incentives has LTC used to achieve success and efficacy, and what are the challenges? We finish by proposing a research protocol to expand knowledge about LTC's conservation impact.

The Little Traverse Conservancy

The LTC, founded in 1972 and Michigan's first regional land trust, is a private organization that uses a combination of economic and social incentives to inspire people to conserve (Rohe, 2002; LTC, 2016a). In an effort to not compete with other organizations (e.g., TNC), LTC's primary focus is to conserve the aesthetics of northern Michigan and not necessarily the ecological importance of natural areas. Its focus on aesthetics in conservation is central to the conservancy, particularly at the local level.

The major goal of LTC is to ensure that future generations can enjoy the natural beauty of northern Michigan and the bylaws of the organization address this in accordance with the steps needed to maintain 501(c)(3) non-profit status (LTC, 1994; LTC, 2016a; Griesedieck, 2007). The main office of LTC is in Harbor Springs, a small town that caters to a large resort community. This community is a dedicated and spatially-attached group of people who visit yearly and are motivated to preserve the current state of the environment.

The Tools of The Little Traverse Conservancy

The LTC uses a variety of tools to achieve its goal, including traditional (e.g., conservation easements, monetary and land donations and purchasing land outright) and strategic (e.g., optimizing partnerships and publicity, taking advantage of incentives, and facilitating

community involvement) methods (Bailey, 2016; LTC, 2016a). For example, LTC uses a variety of media to attract new members and advertise its mission and preserves. It maintains education programs that reach out to thousands of school-aged children annually by promoting science education and outdoor recreation. The LTC also puts large signs outside each preserve that shows the incorporation date and name of the parcel. The organization encourages people to experience nature hands-on, thus fostering community relationships and making preservation a source of pride for local citizens. The LTC has an interactive website, a mobile application that details preserve locations and pamphlets that are distributed to businesses and organizations throughout northern Michigan (Bailey, 2016; Mayhew, 2016; LTC, 2016a).

A combination of these traditional and strategic methods is what has led to LTC's successes in northern Michigan. The following section lists key tools for the development of successful and effective land trusts and how the tools have worked for LTC.

Traditional Land Trust Methods

Traditional land trust methods include implementing conservation easements, encouraging monetary and land donations and purchasing land outright (Cheever, 1996). The LTC utilizes each of these methods in their work. While easements are not the focus of LTC's conservation initiatives, they are important in bringing together private and public interests (Gustanski and Squires, 2000). Easements are also often the only viable option to achieve land conservation (i.e. when a land owner does not want to sell their parcel outright; Flemming, 2016).

The LTC uses easements as a land protection tool by limiting the type or amount of development on the property while the owner retains many private rights. Agreements are enforced and monitored into perpetuity. A record kept with the County Register of Deeds requires all future owners comply with the terms of the original easement (LTC, 2015a). LTC has a process for approving potential easement properties involving its board agreeing that the property has some conservation value in accordance with Internal Revenue Service regulations

(Lindstrom, 2008). Reserved rights, common restrictions of LTC easement agreements and steps for donation are all freely available to donors and the public (LTC, 2015a).

A major component of a successful land trust is encouraging donations, which involves two parties: the donor prospect and the solicitor. The LTC has succeeded thus far in breaking down the normally ridged construction of this interaction (Gustanski and Squires, 2000). Its board believes that fostering relationships is the best way to receive funding from potential donors and prospects are more inclined to donate to their peers than to strangers (Bailey, 2016). Many LTC solicitors are board members who use their positions in the local community to fundraise. This fosters a sense of reciprocity between LTC and donors.

The LTC uses a private protection fund for conservation purchases. If real estate prices are favorable and the fund is well endowed, this funding source can be a major asset, especially in purchasing time-sensitive lands (Clark, 2007). The fund is the source for many private land purchases and the mechanism for giving monetary donations to the organization. The LTC seeks monetary donations from owners of conservation easements, their member base and the public (Griesedieck, 2007). Memorials and honoraria are frequently used strategies by LTC for encouraging donations. Such gifts have created a culture in nearby communities that promotes further giving through social incentives. These gifts amount to between \$50,000 and \$65,000 each year for the organization (LTC, 2005; Clark, 2007).

Partnerships

The LTC takes pride in its many partnerships that have help to facilitate its success and efficacy. One major partner to LTC is the Michigan Department of Natural Resources (MDNR). The LTC has taken advantage of Michigan's state-financed Natural Resource Trust Fund established in 1976 to aid local governments and MDNR, in acquiring land to protect Michigan's natural resources (McQueen and McMahon, 2003). Part of the reason that LTC has been

successful in acquiring funds from the Trust Fund is that they have built a relationship with Trust Fund members (Wieber, 2016).

The LTC has worked with many local and state entities to provide stewardship and educational opportunities as well as encourage participation in and publicity of the organization. A short list includes: school groups, Boy Scouts of America, the University of Michigan Biological Station (UMBS), Michigan State University (MSU), Little Traverse Bay Band of Odawa Indians (LTBB), Petoskey Regional Audubon Society and Tip of the Mitt Watershed Council (TMWC; Bailey, 2016; LTC, 2016a). The LTC is expanding its capacity for outreach through collaboration and partnerships with other organizations. For example, LTC has partnered with TMWC and the Petoskey-Harbor Springs Area Community Foundation to develop the “New Land and Water Education Fund” which aims to promote natural resource education to local youth (LTC, 2016b).

The LTC’s non-adversarial approach allows them to create many partnerships that in turn foster community awareness and land preservation. Including LTC, there exist 29 land trusts in association with the Land Trust Alliance (LTA) within Michigan. There are many benefits to being associated with LTA, especially for small land trusts such as LTC. The LTA works to connect land trusts throughout the U.S. by providing technical resources, legal security, accreditation, funding for conservation efforts and take on the advocacy burden that small land trusts cannot afford for fear of jeopardizing their membership bases (LTA, 2015).

Incentives

Economic and social incentives (Low and Heinen, 1993) are LTC’s most successful tools. Contributions to LTC are tax deductible under section 170 of the Internal Revenue Code, providing an economic incentive for donors. Property donations made to LTC are appraised at fair market value at the time of donation to determine the appropriate tax reduction (Griesedieck, 2007). Financing for land conservation in Michigan includes the state’s incentive program for

property tax, the “Farmland and Open Space Preservation Act”, which allows landowners to write off property taxes for enrolling their land (MDARD, 2016). The program has evolved to include a mechanism that localities can use to purchase development rights on properties within Michigan (McQueen and McMahon, 2003).

Families or individuals donating money to purchase properties, or donating land directly (a frequent occurrence for LTC) can opt to have their names placed on prominent signs on LTC preserves. This is an example of a social incentive that can enhance community standing and be effective in encouraging others to donate (Heinen, 1994). Landowners generally identify with the sentiment that they want to protect their land because of an attachment to nature and their desire to preserve it into perpetuity. Although economic incentives (through tax deductions) are inherent to these transactions, attachment to the land is the primary motivator for many (Taylor-Rogers et al., 2003).

Community Involvement

The LTC is a proponent of community education through citizen-science opportunities and youth naturalist programs such as their Bio-Blitz, youth summer education and EcoSteward events which provide opportunities for educators and youth to interact with the natural world (LTC, 2015b; LTC, 2016b). These educational programs are often paired with and complimentary to stewardship and volunteer programs including trail maintenance, bird watching, field trips and fundraising (LTC, 2016a).

The organization has an obligation to evaluate and monitor lands under conservation easements in accordance with set IRS regulations (Griesedieck, 2007). Stewardship programs and volunteer activities play a large role such as monitoring and evaluation. The LTC has cameras on various trails used to monitor trail visitation frequency, needed maintenance and wildlife activity (Flemming, 2016). Cameras, however, are not the most effective in the monitoring of wildlife or

maintenance needs due to their restrictions in visual range. While monitoring exists, there is little published information on its results for the public.

The Successes and Efficacy of LTC

The LTC has preserves in five counties of northern Michigan (Figure 1) that are either managed by LTC or exist because of LTC land acquisitions. Since LTC's beginning, over 4,000 members have joined and the organization owns over 5,900 hectares of land throughout northern Michigan and has conserved over 8,900 more hectares through easements (LTC, 2012; LTC, 2016a; Flemming, 2016). The LTC's location in Michigan provides the organization with a variety of advantages in terms of opportunities for success. Understanding the demographics of areas where LTC is active is important as it influences member base, willingness to contribute, partnership opportunities and public opinion of the organization (Klenosky et al., 2015).

Figure 1. Locations of LTC, TNC and state-owned lands in Charlevoix, Cheboygan, Chippewa, Emmet and Mackinac Counties in Michigan, USA. Source data: LTC, 2016; TNC, 2016; MDNR, 2016.

Recently, LTC has successfully incorporated working forest preserves (Bailey, 2016). Land recognized as working forest under Michigan's Commercial Forest Act Program (CFA) must be designated as working forest into perpetuity and open to the public for hunting, fishing and other recreation (MDNR, 2014). The initiative offers an opportunity for the organization to

preserve more lands and creates a source of sustainable resource extraction. The CFA preserves currently make up less than 10% of LTC land holdings, but are expected to increase in the future (Flemming, 2016).

One of LTC's largest successes came in 1987 when it partnered with the nearby UMBS to purchase Colonial Point Forest, a 118-hectare tract that added to UMBS's 4,047 hectares along Douglas and Burt Lakes (Heinen and Vande Kopple, 2003; Bailey, 2016). The Colonial Point purchase stimulated substantial positive publicity nationwide, which led to LTC's rapid growth in part by making the Station's 5,000 + alumni familiar with LTC activities. The "Save the Trees" fundraiser is a prominent annual event that promotes donations to LTC. In the fall of 2016, the organization earned approximately \$57,000 and has raised more than \$700,000 over the past 27 years through this event (LTC, 2016b).

The LTC's successes as a land trust can also be attributed to factors such as owning land outright and in partnership with local and state government. These attributes of LTC's success have led to strong relationships with Michigan's state resource agency (MDNR; Bailey, 2016; Wieber, 2016). The organization has helped to acquire state parks, state forests and state wildlife research areas. At the federal level, LTC has helped the U.S. Forest Service purchase inholdings within National Forests in the region (Bailey, 2016; Flemming, 2016).

The success and efficacy of the tools used by LTC depend on support of their member base and local communities. Therefore, understanding these stakeholder groups through social science techniques is imperative for LTC and other land trusts. The LTC recognizes that they have a strong and dedicated membership that allows them to tap into people's enlightened self-interest, a reference to Adam Smith's *Wealth of Nations* (Smith, 1904), and use this interest as a stepping-stone to grow the organization (Bailey, 2016).

Challenges and Opportunities

Myriad obstacles can inhibit land trust organizations. One such obstacle is that economic incentives offered by trusts are not relevant to some landowners. Tax deductions tend to be more helpful for landowners with higher incomes, however, many landowners have large quantities of land, but low incomes therefore decreasing the appeal of a tax deduction (Taylor-Rogers et al., 2003). The relevance of some economic incentives could undermine incentive-based initiatives and keep potential donors from becoming involved with land trusts. Land trusts also need to assure that taxes, managerial control, public access and financial compensation are clearly presented to landowners in all agreements (Bastian et al., 2017).

Two primary impediments for landowners are, (1) the hesitancy of current land owners in restricting land use options of future land owners (e.g., their heirs) and (2) the fear of decreasing their property's value (Taylor-Rogers et al., 2003). These challenges may also serve as a potential opportunity for land trusts such as LTC. The realization that financial incentives may not always be successful or sufficient allows the organization to take advantage of already existing social incentives options (Heinen, 1994).

Controversy exists concerning the ecological value of lands acquired by land trusts and the role they play in conservation. For small land trusts, such as LTC, there is a lack of quantitative data supporting biodiversity conservation due to a deficiency of research detailing ecological values. This leaves a gap in knowledge of conserving biodiversity (Geldmann et al., 2013). There is extensive documentation of qualitative data (e.g., social surveys, newsletters, annual reports and reflections; LTC, 2016a) regarding land trusts and their successes (Kiesecker et al., 2007). However, lands acquired by land trusts should be systematically monitored even if natural assets are not at the forefront of the trust's agenda. The expenses and manpower needed to collect such data are deterrents for many small organizations (Kiesecker et al., 2007; Rissman and Butsic, 2011). One positive factor of easement programs and general land preservation is

conserving land that may have otherwise been developed. The biggest threat to biodiversity is habitat destruction (Primack, 1993). So, whether monitoring takes place to determine the components of biodiversity that are preserved or not, conservation does indeed take place.

Tradeoffs surrounding environmental, social and economic needs promote conflicts between development and preservation. Such conflicts must be met through fostering community awareness and by striking a balance of community and conservation needs (Giannini and Heinen, 2014). However, not all conservation strategies are effective in the face of impeding developmental pressures. Therefore, it is important that organizations, such as LTC, be realistic in their conservation goals (Dorning et al., 2015).

While the mission of LTC is not ecologically driven, their preserved lands have the potential to be sanctuaries for endangered and threatened species in northern Michigan (MDNR, 2016; Table 1). Considering the state and national parks and forests of Michigan, alongside the lands preserved through other organizations, LTC's preserves could very well be serving as corridors, buffers, nesting sites and ancillary habitat for many imperiled species. Detailed studies are needed to assess how LTC preserves fit in the landscape-level conservation matrix of protected areas in northern Michigan.

Table 1: LTC Preserve Counts, Size, Ecosystems Types and Endangered or Threatened Species for Charlevoix, Cheboygan, Chippewa, Emmet and Mackinac Counties in Michigan, USA. Data: U.S. Fish and Wildlife Service; Cohen et al., 2015; LTC, 2016a.

	LTC Preserve Count and Approximate Hectares	Examples of Major Ecosystem Types within LTC Preserves	Selected Endangered Species with Presence within LTC Preserves
LTC Land in Charlevoix, Cheboygan, Chippewa, Emmet or Mackinac Counties	187 Preserves 6,250 ha	Submergent Marsh Emergent Marsh North Wet Meadow North Shrub Thicket Conifer Swamps Floodplain Forest Dry Northern Forest Mesic North Forest Wooded Dune/Swale Sand/Gravel Beach	Grey Wolf (<i>Canis lupus</i>) Kirtland's Warbler (<i>Setophaga kirtlandii</i>) Piping Plover (<i>Charadrius melodus</i>) Hine's Emerald Dragonfly (<i>Somatochlora hineana</i>) Hungerford's Crawling Water Beetle (<i>Brychius hungerfordi</i>) Michigan Monkey-Flower (<i>Mimulus michiganensis</i>)

Discussion

Land trusts are popular methods for small-scale conservation in the United States. Stewardship and local commitments to conservation are the powerhouses behind small land trusts, such as LTC. Education and a strong environmental ethic improve the chance that people will be involved in, and supportive of, land trusts. Incentive-based programs can suffer from problems in cost, efficacy and enforcement, yet have advantages over more traditional practices (Griesedieck, 2007) and both economic and social incentives can be used to promote many conservation programs. Easement and land purchases by land trusts can prevent development and raise community awareness for conservation (Milder and Clark, 2011; Owley and Rissman, 2016). But, political and financial elements can make land trust operations complex. These

intricacies suggest that land trusts should implement legal guidance in their operational platform (Howard, 1992).

Successful land trusts are those that have clear and focused goals. As a land trust becomes more established, it benefits the organization to focus on refining criteria for land acquisition and protection (Howard, 1992; Merenlender et al., 2004). In the early formation, there should be an accounting of the organization's resources including, but not limited to, educated manpower, evaluation techniques, allocation criteria, and a strong member base for stability in both stewardship and finances (Merenlender et al., 2004; Klenosky et al., 2015). Elements of LTC that have assisted in its successes include meticulous record keeping, development, transparency and maintenance of relationships at all levels of government and with the public, and taking a non-advocacy approach (Clark, 2007).

Monitoring should be thought of strategically, in terms of the societal and ecological uses, needs and potential of the conserved area. Land trust programs are dependent on the effectiveness of biological and social data as a means of securing public trust (Kiesecker et al., 2007). As with any local and community-based conservation effort, the need for examining cultural, historical, and community goals to determine best management practices cannot be overlooked. The central motivation for all conservation is protection of the natural world. Since much of the natural world is inhabited and altered by humans, research focused on demographic variables (i.e. age, income and education) and incentives (i.e. social and economic) can encourage community involvement which is essential for effective implementation of conservation programs (Morris, 2008; Suich, 2013; Baldwin and Leonard, 2015).

To address the issues and questions discussed, we propose, and have begun to undertake, a research program that explores more deeply the importance of economic and social incentives used by LTC. Specifically, we have conducted 33 detailed key informant surveys with staff and board members of the organization, local political and civic leaders and staff of public land

management agencies concerning LTC and its programs in the broader context of conservation within the region. These surveys will operate as a means of better understanding the attitudes and behaviors that lead to participation in, and successes of, LTC (Klenosky et al., 2015). In addition, we are in the process of collecting hundreds of semi-structured surveys, which are generally more statistically robust (Shrivastava and Heinen, 2007) from the general membership of LTC to explore views on the effectiveness of social and economic incentives that encourage them to join and donate to the organization (Suich, 2013). Results from that work will be forthcoming.

As stated, LTC does not emphasize ecological importance of the lands it protects and has limited capacity to do more. Some of its holdings are mid-successional (pole-stage) growth forests or abandoned pastures with rather limited current ecological importance, while others are quite old and relatively ecologically diverse. Future conservation and monitoring efforts should include increased research on the ecological functions of land parcels (Baldwin and Leonard, 2015). We propose that LTC, perhaps in partnership once more with UMBS, should develop a research program that would encourage outside researchers (e.g., undergraduates with course project requirements and graduate students with thesis requirements) to pursue projects on individual tracts using standard methods of surveying flora and fauna. Broader projects that use habitat suitability models, land administration domain models, remote sensing and/or geographical information system technology to assess the importance of LTC preserves at the landscape level would also be relevant and many well-tested techniques exist that could accomplish this goal (Heinen and Cross, 1983; Heinen, 1984; Lyon et al., 1987; Lemmen et al., 2015).

III. PERCEPTIONS AND MOTIVATIONS OF LAND TRUST CONSERVATION IN NORTHERN MICHIGAN: AN ANALYSIS OF KEY INFORMANT INTERVIEWS

The purposes of this portion of the study are threefold: (1) to examine the motivations of stakeholders for taking part in local conservation initiatives, (2) to gauge the importance of social and economic incentives to stakeholders, and (3) to assess the perceptions of stakeholders regarding conservation, land trusts and the work of LTC. After reviewing background literature and informal surveys regarding LTC operations and programs (Braddock and Heinen, 2017 *in press*), background data on northern Michigan demography (U.S. Census Bureau, 2015) and relevant information concerning land trust conservation techniques (i.e. Cheever, 1996; Gustanski and Squires, 2000; Merenlender et al., 2004; Clark, 2007; Lindstrom, 2008), several hypotheses were formed.

1. Stakeholder involvement will depend to some degree on self-serving motivators, such as the maintenance of aesthetically pleasing natural areas or recreational opportunities.
2. Stakeholders will be influenced by both economic and social incentives.
3. There will be an overall positive opinion of land trust initiatives in northern Michigan.
4. There will be an overall positive opinion of land trust initiatives in northern Michigan.

Methods

Study Site

The LTC preserves land within five counties (i.e. Charlevoix, Cheboygan, Chippewa, Emmet and Mackinac) of northern Michigan, U.S.A. (Figure 1). These five counties have the following human population estimates: Charlevoix≈ 26,238, Cheboygan≈ 25,427, Chippewa≈ 38,033, Emmet≈ 33,161 and Mackinac≈ 10,890 (U.S. Census Bureau, 2015). Other relevant demographic information is included in Tables 2-4 below.

Table 2. Sex and Education Demographic Data for Charlevoix, Cheboygan, Chippewa, Emmet and Mackinac Counties in Michigan, U.S.A., (The values are percent (%) of total population for each county). Data: U.S. Census Bureau 2010-2015 vintage years, United States Department of Commerce.

	Charlevoix County	Cheboygan County	Chippewa County	Emmet County	Mackinac County
Sex	Male = 49.6 Female = 50.4	Male = 50 Female = 50	Male = 55.3 Female = 44.7	Male = 49.4 Female = 50.6	Male = 51.3 Female = 48.7
High School Diploma or Greater	91.3	88.4	89.4	94.2	87.2
Bachelor's or Higher	27.1	16.8	19.4	33.3	17.9

Table 3. Age Demographic Data for Charlevoix, Cheboygan, Chippewa, Emmet and Mackinac Counties in Michigan, U.S.A., (The values are percent (%) of total population for each county). Data: U.S. Census Bureau 2010-2015 vintage years, United States Department of Commerce.

AGE	Charlevoix County	Cheboygan County	Chippewa County	Emmet County	Mackinac County
Under 18 Years	20	17.2	18.7	20.1	16.6
Over 18 and Under 65 Years	57.9	57.2	64.7	59.5	56.9
Over 65 Years	22.1	25.6	16.6	20.4	26.4

Table 4. Race Demographic Data for Charlevoix, Cheboygan, Chippewa, Emmet and Mackinac Counties in Michigan, U.S.A., (The values are percent (%) of total population for each county). Data: U.S. Census Bureau 2010-2015 vintage years, United States Department of Commerce.

RACE	Charlevoix County	Cheboygan County	Chippewa County	Emmet County	Mackinac County
White/Caucasian	95.5	93.1	71.4	92.7	75.3
Black/African American	0.5	0.6	6.9	0.7	1.9
American Indian/Native Alaskan	1.6	3.0	15.7	3.7	17.3
Asian	0.6	0.4	1.0	0.5	0.4
Hispanic or Latino	1.8	1.5	1.8	1.7	1.6
Two or More Races	1.8	2.9	5.0	2.3	5.3

Data Collection

Key informant interviews were conducted with 33 stakeholders of the LTC organization. Such surveys have been used in a wide variety of natural resource-related studies (e.g., García-Lozano and Heinen, 2016). They have the advantage of allowing interviewees to express a wider variety of opinions than is possible with structured surveys. For the purposes of the present study, open-ended questions were asked regarding land trust conservation, LTC, and stakeholder involvement in conservation initiatives (Appendix 1). Further, the influence of demographic variables (e.g., gender, education and occupation) on stakeholder attitudes, motivations and incentives to conserve were considered (Shrestha-Acharya and Heinen, 2006).

Interviewees were provided questions to answer and topics to discuss, but were not limited to topics included in such questions. All interviews were recorded via the iPhone application Recorder or the Macintosh QuickTime Player audio recording feature. We used qualitative research methods (Bernard, 2011) including phone and face-to-face interviews with identified stakeholders of eight different classifications or interest groups: LTC staff ($n=5$), LTC board members ($n=6$), LTC donors ($n=6$), local politicians ($n=5$), local educators ($n=4$), staff of Michigan's Department of Natural Resources (DNR; $n=5$), tribal members of the Little Traverse Bay Bands of Odawa (LTBB; $n=1$) and representatives of a local non-governmental organization (NGO) in the upper lower peninsula of Michigan ($n=1$). Several individuals interviewed held multiple 'stakes' within LTC and the committees in which LTC has a presence, and thus had multiple perspectives outside of their main stakeholder classification.

Stakeholders of LTC were determined through non-random and purposive sampling (García-Lozano and Heinen, 2016; Bernard, 2011). Participant-driven selection of stakeholders for key informant interviews was also used. For example, if an interviewee mentioned a potential stakeholder that was not before considered, that stakeholder would be contacted to gauge interest and interviewed, if they agreed. Stakeholder groups (LTC Staff, LTC Board, Donors, Politicians,

Educators and Other) were created following identification techniques described by Currie et al. (2009). Groups were determined by the authors based on their relative ‘power’, ‘legitimacy’ and ‘urgency’ with regards to the work of LTC. All stakeholders were selected with the characteristics of being ‘dominant’, ‘dependent’, and ‘definitive’ based on their community roles, occupations and/or connections or awareness of or to LTC (Mitchell et al., 1997; Currie et al., 2009).

All interviews were conducted from May through September of 2016. In total, there were approximately 20 hours of taped interviews and each interview lasted between 15 and 50 minutes. Interviews were transcribed by hand and saved into a Word document. Consent was obtained from all informants, all information collected from interviews was considered anonymous and confidential, and interview content was kept in a password-protected computer by the authors. The research protocol was approved by Florida International University’s Institutional Research Board and met all Federal standards for the use of human subjects.

Data Analysis

The fuzzy logic (FL) approach utilizes degrees or gradients of truth within ‘fuzzy’ sets of data that allow for interpretation of human reasoning and thought (Bellman and Zadeh, 1970). This approach has become popular in the analysis of ‘computing with words’ in social research (Zadeh, 1996), particularly involving surveys, interviews and local knowledge. Data collected through these research methods can be innately vague or ‘fuzzy’, but FL allows researchers to aggregate this information systematically to be better interpreted and used in decision making (Ainsworth et al., 2008). The underlying principles of the FL approach were used in this study to analyze interview data regarding subjective responses involving respondent satisfaction, perceptions and priorities.

Computer assisted qualitative data analysis (CAQDAS; Serry and Liamputton, 2013) was used to discover and decipher social phenomena within the transcribed LTC stakeholder

interviews. Each informant interview was imported to and coded by QSR International NVivo qualitative analysis version 11 software. Data gathered were analyzed by both intra-interviewee coding and inter-interviewee coding comparisons (Parent and Deephouse, 2007). CAQDAS packages, such as NVivo, are useful in social science research as a means of categorizing content (i.e. interviews) attributes, trends and characteristics (Talanquer, 2014).

A code of themes (nodes) was developed to identify similarities, differences and trends among the interviews (Ausband, 2006; Shrestha-Acharya and Heinen, 2006; Klenosky et al., 2015). Themes were then organized and put into a visual diagram (Figure 2). This aided greatly in the management and interpretation of data gathered. The NVivo software assisted in the organization of survey information including the analysis of themes and demographic research. Themes were coded as the interviews were read and a text-by-theme matrix was produced (Bernard, 2011).

Figure 2. Themes coded in LTC stakeholder interviews regarding specifically the workings of the LTC organization.

Frequencies of themes within in each stakeholder group were calculated, along with word similarities within each theme. Similarities between stakeholder responses were determined by coding for word similarity and a Sørensen similarity coefficient index was calculated (values equal to 0 are least similar and those equal to 1 are most similar). The Sørensen similarity coefficient was used as a semi-metric to find the distance between two sets of interview data.

$$S_s = \frac{2a}{2a + b + c}$$

where:

a =count of certain word used in stakeholder group A and B

b =count of certain word used in stakeholder group B but not A

c =count of certain word used in stakeholder group A but not B

We also considered the repetition of words and ideas in the line-by-line analysis of each interview. Interviews were modified to identify responses and/or anecdotes that were given out of the context of the semi-structured questions and organized into a format that could be better analyzed (Elmendorf and Luloff, 2006). For final analysis, a qualitative method for assessment was used through the combination of key informant interviews and a background literature review (Bernard, 2011).

Results

Stakeholder Demographics

The stakeholders were 58% male and 42% female. These percentages are similar to that of the distribution of male and female residents of the counties in which LTC has a presence (Figure 1). Most informants were life-long residents of Michigan (70%), and 15% of total respondents were also residents of the counties in which LTC has had a long-standing presence. About 3% of respondents were originally from outside of the United States, but now reside in Michigan.

There was a mix of representatives from public and private institutions among informants. Those informants that worked in the public sector represented about 48% of the total respondents, where 18% of informants worked in the private for-profit sector and 18% worked for non-governmental organizations or non-profits. Less than 10% of informants were either retired or currently unemployed. Of those informants who answered questions regarding their educational background ($n=20$), 10% had some college education, 45% had completed a four-year bachelor's degree and 45% had completed graduate work earning various advanced degrees

(i.e. Master of Science, Master of Art, Doctor of Philosophy and Juris Doctor degrees). Of the informants completing college, most held degrees in education/administration (25%) or in a natural science or science-related field (e.g., environmental policy; 55%).

Regarding informants who described their civil roles in northern Michigan ($n=15$), 60% expressed their commitment to being coaches, volunteers and stewards of their local neighborhoods and communities. Of those same respondents, 50% also described themselves as educators concerning a variety of disciplines including life skills, nature, health and well-being.

The Motivations for Involvement with LTC

When asked why informants were involved with LTC, 6% responded that recreation was their main motivation, 36% responded that it was for the protection of nature, 12% for education, 18% were due to a professional relationship with LTC, and 3% reported to be involved due to familial, historical or cultural reasons. Staff and Donor stakeholder groups reported to be involved with LTC mostly for the organizations efforts to protect nature. The DNR and Other stakeholder groups said that their professional partnerships with LTC were their main motivation for involvement with the organization. Some informants mentioned multiple motivators for their involvement with LTC and these multiple motivations were included in the overall percentage calculations.

We presented the ‘motivations for involvement’ question in an open response format and responses were reviewed for common themes; such themes were then created after reviewing all interviews in their entirety. Figure 3 displays the percentages of stakeholder groups that were motivated to be involved with LTC for recreation, protection of nature, education, professional relationship, board or staff, and familial, historical or cultural reasons.

Figure 3. Stakeholder (Board, Staff, Donors, Educators, Politicians, DNR and Other) response percentages by most coded categories for motivations for involvement with LTC.

The Satisfaction of Informants with LTC's Work

Overall, 81% of stakeholders from all groups reported that they were satisfied with the work of LTC. Only 6% of stakeholders mentioned that they were not satisfied with the work of LTC or that LTC could improve their work. In addition, 13% of respondents did not give a direct response regarding their satisfaction with LTC and its land conservation or education efforts. Regarding informant perceptions of community satisfaction with LTC, 70% believed that local communities are satisfied with LTC and that LTC is well received in the communities in which it has a presence. One respondent was quoted saying the following regarding the work of LTC:

“To be honest, they’re hands down the best conservancy I think I’ve worked with for many different reasons. They really serve as [a] kind of intermediary between two entities in helping things get accomplished. They do a really great job within their service area...not only helping with some of the technical things that need to happen on transactions and doing a lot of the collaborations that they do with other entities, but serving as that person that will help to smooth that process out for the land owner and make them much more comfortable through the process, it’s much more beneficial. In my opinion...they are kind of the model that everyone should build themselves based-on...because they handle things so well and they do kind of cover all of the things that are so critical.”

The Successes and Advantages of LTC's Conservation Technique

Stakeholders were asked if there were any advantages or successes of LTC's conservation technique (small-scale and community-based land conservation). Regarding key informant responses from all categories, 70% reported that the inner workings of LTC (i.e. the organization's staff, board, history and mission) were major components of the organization's success and are advantages in the northern Michigan area where LTC could have competition from other NGOs. In addition, almost 70% of all interviewed stakeholders believed that one of LTC's major successes is their ability to provide green spaces and preserved areas despite developmental pressures.

Among the other successes and advantages of the LTC organization (Figure 4), partnerships and relationships with organizations, institutions and communities (45%) as well as the timing of LTC's start-up in the area (1970's) and their location (45%) were most highly reported. The Board stakeholders believed that the top two reasons for LTC's successes as an organization were due to the inner working of the organization as well as the partnerships the organization has fostered over the years. This contrasts with local Educator stakeholder opinions that point to the provision of green spaces, education and opportunities that have made LTC successful. Regarding general advantages and successes of LTC, two respondents had the following comments:

“By conserving the natural beauty of this area [northern Michigan], LTC satisfies the needs of all groups: landowners who want to protect and make natural areas available either through donation or conservation easement; business owners, developers and their employees who will benefit financially in the long term; members of the public who desire access to our area's natural areas; other non-profits which share the Conservancy's goals; and families, schools, and children who benefit from educational opportunities.”

“I think they do an excellent job balancing the interests of all parties. They are very smart in that they have developers, real estate people and contractors involved so they can see how the inside work. Where a developer normally wouldn't embrace a concept...we see that they [developers] do once they see that it is to the communities benefit and to their benefit...if they want to develop some land...having some open spaces nearby...it is a real plus and I think it is really progressive and it is becoming more and more of a positive draw.”

Figure 4. Stakeholder (Board, Staff, Donors, Educators, Politicians, DNR and Other) opinions (in percentages) regarding the successes and advantages of LTC's conservation technique in northern Michigan.

The Challenges of LTC's Conservation Technique

The most reported challenge was that LTC has more land and responsibilities than they have the manpower (e.g., staff, stewards and volunteers) to manage (21%). Some respondents fear that LTC has taken on enough property and if they do not focus on managing that property, they will have issues maintaining control, particularly regarding components of the organization that involve money (conservation easements, fundraising, and donations). Over 15% of respondents reported that a challenge to LTC is that there exist many differing attachments to land and views of appropriate land use.

Further, 12% of respondents could not think of a disadvantage or challenge to LTC's work or did not think there were disadvantages at all. Other concerns brought up by stakeholders included the age of volunteers, staff, donors, and stewards. About 9% of respondents believed that LTC would be challenged in the future if they do not proactively increase youth participation in their programs. The remaining challenges mentioned were that not enough community members take advantage of LTC resources (6%), preserving land is taking it off the tax roll (3%), and the organization is too small and needs to expand its reach within the state (3%).

Recommendations for LTC

The highest reported recommendation from all stakeholder groups (30%) was that LTC should not change anything about the organization. The next highest reported recommendations were that LTC should increase their capacity to publicize and advertise to local communities (21%), expand outreach programs (15%), and expand education programs for adults and youth (15%). The other stakeholder recommendations (representing from 3-9% of informant responses) are included in Figure 5.

The recommendation with the largest percentage from Board member stakeholders was that LTC should keep their operations mostly the same. Staff stakeholders reported that LTC should work more to expand their outreach operations and service areas. Donor stakeholders largely agreed that their main recommendation to the LTC organization should be that they include more restoration projects into their work. Local educators and politicians believed that LTC and their surrounding communities would benefit most if LTC could increase the publicizing and advertising of their programs and resources.

Figure 5. Percentages of stakeholder (Board, Staff, Donors, Educators, Politicians, DNR and Other) responses regarding recommendations for LTC.

Sentiments, Coded Trends, Themes, and Word Similarities in Interview Analyses

From the total collected and coded interviews, 23% of all respondents mentioned the ethics and passion of LTC's staff and surrounding local communities as an important consideration. In addition, 36% of respondents specifically mentioned the work of LTC's Executive Director, Tom Bailey, as a reason for the successes of the organization. One informant said the following concerning Tom Bailey and LTC staff:

“Something that is really important is the people who work in the conservancy, not necessarily just how the organization is... yes, the trust is a big thing...but, that has been facilitated by the types of people and the kinds and the intelligence of the people who work within the organization ...Tom Bailey being a major factor in that. He is just so passionate in just such an honest way that it does motivate you.”

The Sørensen Similarity index coefficients are shown with stakeholder group connections in Table 2. Staff and Board stakeholder groups of LTC had most similarity in word use ($S_s = 0.489$). Politicians and Educators had least similar word use in coded interviews ($S_s = 0.304$).

Table 5. Sørensen similarity index coefficient data for LTC stakeholder groups (Rows represent stakeholder group A and columns represent stakeholder group B in the Sørensen equation).

Stakeholder Group A	Stakeholder Group B	Sørensen Coefficient
Staff	Board	0.489
Politicians	Board	0.462
Staff	DNR	0.456
Donors	Board	0.455
Staff	Politicians	0.446
Politicians	Donors	0.443
Staff	Other	0.441
Other	DNR	0.439
Staff	Donors	0.433
DNR	Board	0.426
Donors	DNR	0.415
Other	Board	0.411
Politicians	Other	0.402
Other	Donors	0.400
Politicians	DNR	0.399
Educators	DNR	0.376
Staff	Educators	0.341
Other	Educators	0.341
Educators	Board	0.312

Educators	Donors	0.308
Politicians	Educators	0.304

Discussion

There is often a mix of factors that encourage community support or involvement in conservation (Reddy et al., 2017). Such factors are usually in the form of social or economic incentives. These incentives, however, are frequently met with challenges in long-term replicability and relevance, but their identification and modification are important for the success of environmental initiatives involving community support (Denison and Ruston, 1990; DeYoung et al., 1993; Heinen, 1995; Suich, 2012). The evolution of community behaviors in relation to conservation activities should be noted and adjustments should be made to identify these changes (Reddy et al., 2017). The highest reported motivation of stakeholders' involvement with LTC was for the protection of nature. This result suggests that although there could be both social and economic (e.g., tax breaks) motivators for stakeholder involvement, stakeholders are interested, firstly, in the conservation of land and preservation of nature, allowing us to reject our hypothesis that both social and economic incentives will equally be key influencers.

This finding also supports, to some extent, our hypothesis that stakeholder involvement depends on self-serving motivators, such as the maintenance of aesthetically pleasing natural areas or recreational opportunities. While the pure protection of land does not outright suggest there is a self-serving motivator, key informant interview questions concerning successes, advantages, and reasons for satisfaction did indicate that recreation, green space availability to communities, and general enjoyment of natural beauty were important components of land conservation to these stakeholders.

Most stakeholders said that they and local communities were satisfied with the work of LTC; providing support for our hypothesis that there would be a general positive opinion of the organization in the northern Michigan area. This satisfaction could be attributed to the message

that LTC's dedication for land conservation (the protection of scenic beauty) resonates with the public in the area. It has been shown that the way in which conservation initiatives are presented to the public greatly influence resultant participation and efforts to engage with the organization as well as overall satisfaction (Kussmanoff et al., 2016). One area where LTC differs from other organizations is that they focus on the social benefits of their work in a natural realm. In fact, current recommendations for other land use, conservation and planning organizations include broadening the anticipated benefits of the organization to include both aspects within natural and human systems (Kussmanoff et al., 2016). The LTC has implemented this philosophy into their work since their inception, and it appears to have resonated through their outreach efforts to local communities.

As mentioned in stakeholder quotes about satisfaction, success and advantages regarding LTC, partnerships have been vital in the creation of an organization that northern Michigan communities find satisfactory. These partnerships aid in the transfer of knowledge and resources as well as in trust building between NGOs and local, county, state and federal entities. The LTC works to not only propel itself into a successful future, but also to empower, educate and create capacity building systems for their neighbors (state organizations, schools, community groups and donors alike; Braddock and Heinen, 2017).

The most frequently reported successes and advantages of LTC were related to the inner operations and staffing of LTC and the many preserved areas they have acquired over the years. Interestingly, respondents also suggested that the 'charmed' area in which LTC is located had a lot to do with its success. This 'charmed' area references the large communities of resort or seasonal residents that want to keep their vacation haven preserved and support year-round residents that own small tourist-driven businesses. Many families have been vacationing in northern Michigan for generations and respondents made clear the desire of communities to keep green spaces aesthetically beautiful and natural for their future families.

The responses of LTC stakeholders regarding organizational disadvantages or challenges were varied and no one opinion was held by most respondents. However, the highest percentage of informants suggested that the small size of LTC could be a current disadvantage and a future challenge for the organization. While the small size could lead to a more intimate feel to the organization, there may be concerns for capacity building and influence impact as the landscapes of LTC's holdings continue to change.

Among other challenges, was the emphasis on local land use and land owner attachments to parcels in the northern Michigan area. To clarify, the land in this area is appreciated not only for its scenic beauty but it is utilized by many for recreational purposes, scientific research, conservation initiatives, hunting, resource extraction, as well as familial or cultural connections and identity. These differing attachments could challenge LTC's success in both acquiring parcels and providing managed lands that appeal to multiple land user types. Better understanding the reasoning for land use activities will help to clarify to organizations like LTC the complexities of landowner and land conservation motivations (Brenner et al., 2013). Community-organization relationships are critical for land trusts and better understanding local community operations is important for sustaining an organization that promotes citizen involvement (Peters et al., 2017). This reiterates the importance of social science studies in conjunction with conservation sciences.

Several stakeholders mentioned the need for conservation and management of LTC preserves. This need is likely to grow as LTC expands further. With about 6,000 ha (albeit, discontinuous) under their direct ownership, and that figure increasing regularly, general habitat and natural resource assessments would likely improve the management of those reserves and add to the growing database of the Nature Conservancy, Michigan Department of Natural Resources and MSU partnership under the Michigan Natural Features Inventory (MNFI, 2016).

Many remote sensing techniques have been developed and tested to assess general habitat potential (Heinen, 1984), and can be done cheaply in concert with modeling areas future habitat

potential after managerial actions (Heinen and Mead, 1984). In addition, assessments that rely on volunteers or cameras to monitor trail use and conduct new trail feasibility studies are also very useful (Heinen, 1988), especially as popular areas become more heavily used. The LTC has implemented several programs like these that utilize technology, citizen science, and volunteer monitoring programs (e.g., EcoStewards, Bioblitz, American Kestrel Partnership monitoring program; LTC, 2016d), but their continual growth and development will be critical for the organization into the future.

The LTC has in the past partnered with UMBS and this could be greatly expanded inexpensively by offering students internship and thesis research opportunities. Developing this partnership to increase UMBS's public outreach initiative with local land owners would also fulfill previous recommendations made for the research station (Heinen and Vande Kopple, 2003). In fact, land trusts are consummate organizations for scientists to partner with and study to better understand, develop, and improve conservation management techniques in a given area (Peters et al., 2017) as well as increase citizen science activities, something that in recent years has become a focal point of many researchers and institutions (Adams et al., 2014; Conrad and Hilchey, 2011; Shirk et al., 2012).

Ethics was a prominent theme mentioned regarding the willingness of local communities to be involved with LTC and how LTC can maintain such a large member base (4,000+) for their size (11 full time year-round, 3 part-time year-round, 2 full time seasonal and one part-time seasonal positions). This was an interesting finding, as personal communication with LTC staff brought about a deep connection with the ideals of Aldo Leopold's Land Ethic philosophy in conservation. This axiology philosophy denotes a mutual respect or trust for members of both natural and social community systems (Leopold, 1949). This sentiment is something that LTC as an organization tries to live by and promote in their surrounding communities, particularly through their education and outreach initiatives (LTC, 2016c; LTC, 2016d).

There was not a major difference in stakeholder word frequency and coding. The Sørensen Similarity index coefficients did not provide great range among informant interviews. The lack of diversity and range in indices suggest that the responses of stakeholders were not completely similar ($S_s = 1$) nor completely different ($S_s = 0$). However, the least common stakeholder responses were the politician and educator groups, showing a difference in their thoughts regarding LTC and land conservation ($S_s = 0.30$). The stakeholder groups with the highest word similarity were the LTC board and LTC staff (almost $S_s = 0.50$). These results could reflect the idea that this part of Michigan is, in fact, a ‘charmed area’; meaning most individuals potentially have a similar conservation ethic or motivation as fostered by the communities in which they have developed such outlook.

IV.CONCLUSIONS

The information presented here is useful in understanding the influence on and dynamics of LTC stakeholders and more greatly, the motivations of small-scale land trust stakeholders with regards to preserving the scenic beauty of northern Michigan through land conservation (the primary goal of LTC).

Interviews provided the insight that while the natural environment is central to land conservation initiatives, its manipulation, utilization and appreciation by the human social environments cannot be overlooked in developing a successful conservation organization. These factors are key to how people interact with the world around them, and their understanding allows land conservation organizations to focus their message on motivators that will capture their surrounding communities. In addition, the integration of social and natural science disciplines in these initiatives allow for the realization of changing attachments to land and their consequent impacts on ecosystems.

A decent part of interview content focused on the sentiments of the LTC organization regarding passion and stakeholder/community satisfaction. This speaks to how invaluable relationship and partnership formations are for the facilitating successful land conservation. This research will produce an instructive case study for the successful operation of land trust organizations as a means of beneficial and educational conservation. The strategies of this study will create a focus on conservation efforts, identify the goals of the organization, and create measures that can be used to evaluate the set goals.

V.RECOMMENDATIONS FOR FUTURE RESEARCH

The interviews and literature reviews conducted for this master's thesis made evident opportunities for future research involving LTC and successful land trust conservation in northern Michigan. One potential area of future research that would benefit LTC as an organization is finding the means to increase collaboration and integration of traditional ecological knowledge (TEK) and native communities in their programs and practices.

Another area of future research that would be useful in determining the ecological advantages of the matrices of preserves, land easements, state and federal land among other reserved or undeveloped lands through northern Michigan is through the utilization of geographic information systems (GIS) technologies.

Traditional Ecological Knowledge

The Little Traverse Bay of Odawa Indians (LTBB), located in northern Michigan, is comprised of tribes of Odawa or Anishnabek decent. Throughout their rich and complex history, the Odawa have kept a close connection with their surrounding natural environments. This connection forms the basis of the Odawa people's origin story, religion, naming system and most every facet of their lives (Hemenway, 2016; McClurken, 1991). Today LTBB as a tribe consists of over 4,000 members and as a governing organization, employees over 100 people. The LTBB is a federal recognized tribe (as of 1994) and receives the associated settlements that come with this status. The reservation land of LTBB is approximately 900 square kilometers, a fraction of their historical land ownership (LTBB, 2014).

The LTC and LTBB first interacted in the early 1980s and currently have several education and outreach programs where tribe members hold talks and guided tours to spread TEK of their native land (LTC, 2016a; Hemenway, 2016). One of the most famous collaboration projects between LTC and LTBB was the Taimi Hoag conservation easement acquisition. It was after the Taimi Hoag project that LTC began developing the ideas of cultural conservation

easements (traditional, ceremonial and medicinal) and conservation easement supplemental agreements (Middleton and Trafzer, 2011a), now a growing part of the organization.

The LTBB as a governmental unit has created a “Master Land Use Plan” as well as a land acquisition and policy plans that detail past, current and future land uses within the reservation and land trust preserves associated with the Tribe. These plans include land cover distributions and uses, infrastructure development as well as tribal input from the Tribe’s planning department, the tribal GIS department and tribal council. This master plan is useful for organizations, such as LTC, to better understand the developmental and land use changes of the land they are trying to conserve or preserve over time. TEK is a fluid cultural framework involving native peoples, their beliefs and worldviews, as well as the collection, transmission and processing of information dealing with the relationships between native peoples and their surrounding environments (Pierotti, 2011; Shackeroff and Campbell, 2007). These types of plans can lead to an easier integration between land trusts and native peoples because they can act as a translation of TEK and tribal histories in a way that an outsider could possibly understand (LTBB, 2004).

The LTBB has also developed a native plant guide that describes the location, name and cultural use of many of Michigan’s native plants within the land of the LTBB reservation (LTBB, 2009). The data from this guide and its subsequent editions can serve as monitoring data source for conservation organizations, such as LTC. With TEK information and records from LTBB, LTC can track and monitor species migrations and land cover changes as well as cultural land use changes.

The tools of land trust organizations can, through collaborative efforts, increase the effectiveness and impact of tribal conservation initiatives. TEK and integration with non-native organizations have the potential to expand the reach of established tools and add new tools and resources to a land trust’s repertoire. Tribal use of external conservation mechanisms (i.e. those of non-indigenous organization) can increase the applicability of such mechanisms to include

cultural and historical resources, community development, and land use data. Legal aid is one of the major benefits that a land trust organization can provide a tribal group or community. These collaborations can allow the land trust to aid a tribe in legal disputes or lawsuits over land claims (Cavanagh, 1998; Middleton and Trafzer, 2011a).

Collaborative conservation efforts could be conduits for environmental justice. While the cause of these injustices may originate from various past and current oppressions of native peoples, by working with private organizations native communities can help their tribes gain greater recognition, funding, resources and positive exposure (Middleton and Trafzer, 2011b).

While the current collaboration between LTC and LTBB is a good start, there are recommendations to be made and challenges to be worked through when developing collaborative conservation efforts of any kind and, especially, those involving native communities (Berkes, 2012; Middleton and Trafzer, 2011b; Pierotti, 2011). Acknowledgement and successful collaboration of TEK and conservation-driven organizations are generally rare, however, there are clear advantages and benefits to both native and non-native groups if challenges are addressed (Kimmerer, 2002).

More studies should be conducted regarding native groups and their natural resource management practices as well as cultural traditions to develop recommendations for future research (Berneshawi, 1997; Cronin and Ostergren, 2007). Future research considerations regarding such collaborations should include emphasis on environmental and social ethics, land use changes and adaptations, gender roles and cultural context (LTBB, 2004; Shackeroff and Campbell, 2007; Reo and Whyte, 2012).

Geographic Information Systems Technologies

Monitoring processes in land conservation initiatives should be thought of strategically, in terms of the societal and ecological uses as well as the needs and potential values of a conserved area, as these can secure public trust in conservation programs (Kiesecker et al., 2007).

The use of GIS technologies can help to gain this trust by providing easy-to-interpret visual and physical representations of land trust data.

As part of this master's thesis a preliminary study was conducted exploring the potential for environmental corridors in the counties in which LTC has nature preserves. The figures presented show the location of LTC preserves as well as lands held by other conservation entities or institutions such as local tribal groups, MDNR, TNC, and the National Park Service (Figure 1A). A complete constructed corridor which combines data from all sources on preserved land area is shown in Figure 2A.

Maps such as these can also be useful in tracking the endangered species activities within preserved land corridors. To show how this could be effective, data on an endangered species of the area (Hine's Emerald Dragonfly) were collected and imposed over the created potential corridor areas (Figure 3A). Potential threats (e.g., roadways and pollution) to the success of the created corridor are shown in Figure 4A. These data, when presented through a GIS platform are informative for policy makers, conservationists and community members to understand their impacts on land corridors and endangered species in their surrounding environments.

Some recommendations for future research involving GIS include, the need for more available data on the exact locations (through combined monitoring and remote sensing methods) of threatened and endangered species within northern Michigan (Table 1). There exists a clear connection and overlap of preserved natural areas within northern Michigan that could serve as a corridor for a variety of keystone, endangered or threatened species. This needs to be further explored with on-the-ground field work and research. Also, there exist some major threats to the future success of these potential corridors (e.g., major roadways and pollution hubs) that run directly through the proposed corridor, these should also be researched and evaluated.

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APPENDICES

Figure 1A. Land parcels used in consideration of northern Michigan corridor development for endangered or threatened species

Figure 2A. Constructed corridor habitat for threatened or endangered species in northern Michigan

Figure 3A. Location of endangered species (*Somatochlora hineana* – Hine's Emerald Dragonfly) within developed northern Michigan corridor area

Figure 4A. Location of potential corridor threats for success of habitat sanctuary for threatened and endangered species in northern Michigan

Appendix I. Sample Little Traverse Conservancy (LTC) Key Informant Interview Questions

Dear Respondent,

My name is Kathryn Braddock and I am a graduate student at Florida International University within the Department of Earth and Environment. I am pursuing Master's of Science degree in Environmental Studies with a focus on social incentives in conservation. I will be interviewing stakeholders of the Little Traverse Conservancy (LTC) Land Trust in Michigan as a means of understanding social aspects of the land trust method of conservation. Your personal information, if you choose to include it, will not be used individually or in any way that could identify you later.

There is minimal risk associated with the interview process and all completions are greatly appreciated.

Kathryn N. Braddock

Background Information:

1. Are you originally from Michigan? Where in Michigan? Or Where in the US?
2. Why do you currently reside where you do in Michigan?
3. What is your educational background?
4. What is your current occupation?
5. What is your role in the community in which you live?

LTC:

1. Do you know of the Little Traverse Conservancy? If so, what is your relationship with LTC (donor, volunteer, staff, etc.) (If staff or volunteer, please describe your duties within the organization).
2. In your own words, what does the Little Traverse Conservancy do?
3. What are your opinion on the conservancy's technique / what is the conservancy's conservation technique?
4. What are your opinions regarding LTC's impacts in N. Michigan and the local community?
5. How satisfied are you with the work of LTC?
6. How satisfied do you think the general community is with the work of LTC?
7. If applicable, why are you involved with LTC?
8. Are there any great advantages or disadvantages of LTC's presence and/or work in northern Michigan?
9. In your opinion, what are the major successes of LTC?
10. Do you have any recommendations or suggestions for LTC in terms of what they could improve on or add to their work?
11. How do you think organizations like LTC will need to change considering future events such as those that accompany climate change?

Environment and Conservation:

1. Do you identify with the terms conversationalist or environmentalist?
2. How important is environmental education to you? Why?
3. Why is/isn't land conservation in northern Michigan important to you?

Please, feel free to add any additional comments or relevant anecdotal information here: